

wintering grounds in southwestern Idaho, because their ranges can be large and include mountainous terrain and roadless areas. We used radiotelemetry to locate and describe golden eagle wintering areas. We radio-tagged 11 golden eagles on their wintering grounds in southwestern Idaho with conventional and satellite received transmitters during 1993–94. Movements were monitored one to two times per week visually and daily by satellite. Adult golden eagles showed fidelity to wintering areas, but did not defend them from other eagles. Adults were more consistently tracked by conventional telemetry than were subadults. Wintering areas of subadult eagles were larger than those of adults. Wintering ranges derived from satellite locations were larger than those derived from visual locations. Non-resident adults spent the breeding season in Alaska and western Canada while subadults stayed in the northwestern United States. Travel times for migration of adults to presumed breeding grounds varied from 6–27 da.

#### BAND RECOVERIES OF DIURNAL RAPTORS Banded IN THE MARIN HEADLANDS, MARIN COUNTY, CALIFORNIA

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Since 1983, 15 species of diurnal raptors have been banded in the Marin Headlands, Marin County, California. These birds are trapped at blinds in the Headlands from August through December by volunteers of the Golden Gate Raptor Observatory. To date, we have banded 6523 diurnal raptors, and have had 162 band recoveries of eight species. We have had 141 band recoveries from California, with the remainder from Oregon, Washington, Idaho, and Baja California and Sonora, Mexico. Of the 15 species, we have banded red-tailed hawks (*Buteo jamaicensis*), Cooper's hawks (*Accipiter cooperii*), and sharp-shinned hawks (*A. striatus*) in the greatest numbers. For 2631 red-tailed hawks banded, 83 band recoveries have been reported, with a 3.2% recovery rate. We have mapped the band recoveries by age of bird and by season of recovery to make seasonal comparisons of the data. For example, autumn band recoveries for juvenile red-tailed hawks extend 190 km inland from the Pacific Coast, and occur from central to northern California. Autumn band recoveries for adult red-tailed hawks are found in a larger area, extending 350 km inland, and extending from southern California to central Washington. Winter band recoveries for juvenile and adult red-tailed hawks occur predominately within 80 km of the Pacific Coast, representing a smaller area than autumn recoveries. These results suggest that there are some differences in geographic areas used in autumn and winter by the juvenile and adult red-tailed hawks. Smaller band recovery sample sizes for Cooper's and sharp-shinned hawks allow for a more limited set of comparisons. Of

interest are several autumn and winter band recoveries in Baja California for juvenile Cooper's and sharp-shinned hawks.

#### WINTERING HABITAT AND FEEDING BEHAVIOR OF WHITE-TAILED SEA-EAGLES AND STELLER'S SEA-EAGLES IN HOKKAIDO, JAPAN

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Hokkaido, Japan is a part of the wintering region of white-tailed sea-eagles (*Haliaeetus albicilla*) and Steller's sea-eagles (*Haliaeetus pelagicus*). However their wintering ecology in Hokkaido was little known. I studied the habitat and food resource use of eagles in winter seasons. First, I counted the number of eagles at the 71 fixed sites near water or garbage sites in the northern and eastern parts of Hokkaido as a preliminary study. These censuses were carried out six times at each site during November 1991 to April 1992. These sites were divided into five habitat types such as sea, lake, basin, estuary, and garbage dump. Habitats where eagles congregated shifted according to the census time. Eagles changed wintering areas flexibly corresponding to environmental conditions and fishery activities. Additionally, it seems that the selection of wintering habitat differed with species and age. Next, I observed the feeding behavior of eagles in three different habitats (river, lake, and garbage dump) from November 1993 to March 1994. The relationships among the food items, inter- and intra-specific interactions, and the feeding strategies will be discussed. This study was funded by WWF Japan.

#### INVESTIGATION OF ARIZONA PEREGRINE FALCON EGG SHELL THICKNESS

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In 1993, the Arizona Game and Fish Department initiated a study to collect and measure peregrine falcon (*Falco peregrinus*) eggshells from the Arizona breeding population. This sample mean will be compared with a sample mean for eggshells collected in Arizona more than 10 yr ago and a pre-DDT sample mean for eggshells collected in California. We present our 1993 and 1994 collection results.

#### VOCALIZATION BEHAVIOR OF LOGGERHEAD SHRIKES (*LANIUS LUDOVICIANUS*) IN CAPTIVITY

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